BERK ISKENDER

+1 217 721 31 04 | berki2@illinois.edu | https://berkiskender.github.io/

EDUCATION

- **University of Illinois Urbana-Champaign (UIUC), IL, US** — Overall GPA: **3.94/4.00**
  M.S./Ph.D., ECE **Advisor**: Prof. Yoram Bresler **M.S. Graduation:** 2020 / **Ph.D. Expected**: Spring 2024
- **Middle East Technical University (METU), Ankara, TR** — Overall GPA: **4.00/4.00**
  B.S., Electrical Engineering **Rank**: 1st (Valedictorian) **Graduation**: June 2018

EXPERIENCE

Summer/Fall 2022 — *PhD SWE (Machine Learning) Internship, and Student Researcher*, ***Google - CA, US***
· Research on improving self-supervised dense contrastive learning of uncurated data using transformers, different dense comparison techniques, and reconstruction decoders (work published in NeurIPS 2022 Self-Supervised Learning - Theory & Practice Workshop).

Summer 2021 — *PhD SWE (Machine Learning) Internship,* ***Google - CA, US***
· Implemented & compared various visual-semantic image embedding techniques, and deployed a novel supervised contrastive learning-based method to replace the attribute-based embedding to assist graph-hierarchical clustering at Google Geo.

Summer 2020 — *Research Internship,* ***Michigan State University (MSU) - MI, US***
· Worked on developing block-matching algorithms with learned sparsifying transforms for image denoising (work published in IEEE ICIP 2021) and dynamic estimation methods. **Advisor:** Prof. Saiprasad Ravishankar

Summer 2019 — *Graduate Research Internship,* ***Los Alamos National Laboratory (LANL) - NM, US***
· Worked on the machine/deep learning-based tomographic reconstruction methods for ill-posed single-view reconstruction.

Summer 2017 — *Internship,* ***ASELSAN Advanced Sensing Research Program Department - Ankara, TR***
· Time/frequency domain passive acoustic mapping, sparsity-based microbubble detection with constrained optimization for ultrasound.

Summer 2016 — *Internship*, ***KAREL Electronics Research & Development Center – Ankara, TR***
· Performed image processing tasks for vehicles on ARM NXP iMX6 by cross-compilation of OpenCV libraries.

Teaching — Graduate teaching assistant (TA) of Digital Signal Processing course for Fall 2019, Spring 2020, and Fall 2020 (Head TA)

PUBLICATIONS

- B. Iskender, M. Klasky, Y. Bresler, "RED-PSM: Regularization by Denoising of Partially Separable Models for Dynamic Imaging", *IEEE/CVF ICCV 2023.*
- B. Iskender, M. Klasky, B. Patterson, Y. Bresler, "Factorized Projection-domain Spatio-temporal Regularization for Dynamic Tomography", *IEEE ICASSP 2023.*
- B. Iskender, Z. Xu, S. Kornblith, E. Chu, M. Khademi, "Improving Dense Contrastive Learning with Dense Negative Pairs", *NeurIPS 2022: 3rd Workshop on Self-Supervised Learning: Theory and Practice.*
- B. Iskender, M. Klasky, Y. Bresler, "Dynamic Tomography Reconstruction by Projection-Domain Separable Modeling", *IEEE IVMSP 2022 & arXiv:2204.09935.*
- B. Iskender, Y. Bresler, "Scatter Correction in X-ray CT by Physics-Inspired Deep Learning", *IEEE Transactions on Computational Imaging*, *2022.*
- S. Liang, B. Iskender, B. Wen, S. Ravishankar, "Learned feature-domain block matching for image restoration", *IEEE Intl. Conf. on Image Processing (ICIP) 2021*.
- B. Iskender, Y. Bresler, "A physics-motivated DNN for X-ray CT scatter correction", *IEEE 17th Intl. Symposium on Biomedical Imaging*, *IEEE ISBI 2020.*
- B. Iskender, Y. Bresler, "X-ray CT scatter correction by a physics-motivated DNN with opposite view processing", *CT Meeting 2020.*
- B. Iskender, S.F. Oktem, "Image restoration for sparse aperture optical systems", *26th Signal Proc. and Comm. Applications Conference (SIU), 2018.*

RESEARCH TOPICS & INTERESTS

- Interested in *machine learning, computer vision, signal processing, computational imaging & the theory of inverse problems.*
- *Ph.D.*: Dynamic imaging from undersampled measurements using machine learning & analytical techniques.
- *M.S.*: De-scattering inverse problem in X-ray CT imaging using physics-inspired deep learning.
- *Internships:* Improving dense contrastive learning for computer vision tasks, block-matching algorithms with learned transforms for denoising.
- *B.S.*: Sparsity-based deconvolution for periodic aperture imaging.

SEVERAL COURSEWORK & PROJECTS

- ***Computer Vision:*** *Project:* Implementation/comparison of SoTA algorithms for agricultural image segmentation
  Coursework: content-based image retrieval, shape retrieval, image registration, optical flow calculations, scale-space blob detection…
- ***Machine Learning:*** Project on supervised image super-resolution and denoising on low-dose X-ray images
- ***Machine Learning for Signal Processing:*** *Project:* Developing a super-resolution objective maximizing Fourier shell correlation for a GAN-based model
- ***Generative AI Models:*** Application of deep prior generative models for video reconstruction to dynamic tomography problem
- ***Digital Imaging:*** Project on CNN-based projected gradient descent for consistent X-ray CT scatter correction
- ***Vector Space Signal Processing****:* Project on reducing spatially varying out-of-focus blur
- ***Computational Inference and Learning:*** Project: LASSO problem analysis and comparison of various analytic/learning-based algorithms
- ***Senior Project****:* Implemented computer vision tasks (shape detection, motion control, and decision) of a basketball-playing robot on Raspberry Pi 3
- ***Digital Signal Processing II:*** Project on solving ill-posed inverse problems using ML/classical models
- ***Probability & Random Var.:*** Project on maximum likelihood parameter estimation from observations in the detection of moving objects
- ***Communications I:*** Project on hypothesis testing for amplitude or frequency-modulated signals
- ***Random Processes, Convex optimization, …***

QUALIFICATIONS

- **Programming**: **Core:** Python, Pytorch, TensorFlow, Matlab, LaTeX, **Used for various tasks:** C/C++, SQL, HTML, ARM Assembly
- **Application, Software**: Github, OpenCV, MS Office, LabView, GEANT4, **Used for various coursework:** Altera Quartus, LTSpice, KeyCreator (CAD)
- **Operating Systems**: Linux OS, Linux Board Support Package (BSP), MS Windows OS
- **Languages**: English (Proficient), Turkish (Native), Spanish (Beginner)

ACHIEVEMENTS & AWARDS

- Ranked 1st in the Electrical Engineering department (Valedictorian) at Middle East Technical University, 2018
- METU EE Bulent Kerim Altay Award (6 times) (Highest academic performance award for the related semester given by the department)
- Nationwide Top 100th student scholarship given by the Turkish Ministry of Education
- 420th in the national university entrance exam over 2 million students and 28th in English proficiency in the national university exam